

ROUTING AND RECORD SHEET

SUBJECT: (Optional)

STAP Report on S&T Intelligence

FROM:

Executive Secretary, STAP

EXTENSION

NO.

STAP-0033/82

DATE 11/24/82

TO: (Officer designation, room number, and building)

DATE

OFFICER'S INITIALS

COMMENTS (Number each comment to show from whom to whom. Draw a line across column after each comment.)

1. O/DCI []
7E12 HQ

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4 DEC 1982

[Signature]

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DIRECTOR OF CENTRAL INTELLIGENCE

Science and Technology Advisory Panel

STAP-0033/82
24 November 1982

MEMORANDUM FOR:

[REDACTED]
Special Assistant to the DCI

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FROM:

[REDACTED]
Executive Secretary, STAP

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SUBJECT: STAP Report on S&T Intelligence

1. Per our recent telephone conversation, I am forwarding a copy of a STAP report on the Intelligence Community's capability to fulfill the scientific and technical intelligence needs of national policy makers. The report also addresses a number of S&T management and organizational issues which I know are of interest to you.
2. For your general information, I am also forwarding a current STAP membership list and a resume of the STAP's mission and principal functions. If the Panel can be of further assistance to you, please do not hesitate to call me.

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Attachment

THIS MEMO IS UNCLASSIFIED
UPON REMOVAL OF ATTACHMENT

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Director of
Central
Intelligence

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Scientific and Technical Intelligence: The Intelligence Community's Capability To Meet New and Evolving Needs of National Policymakers (U)

**A Report of the DCI's
Science and Technology Advisory Panel**

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*STIC 81-007
November 1981*

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Scientific and Technical Intelligence: The Intelligence Community's Capability To Meet New and Evolving Needs of National Policymakers (U)

Introduction

In late 1978 the DCI's Science and Technology Advisory Panel (STAP), with the DCI's approval, began an extended and wide-ranging review of the Intelligence Community's (IC) capability to meet the needs of national policymakers for foreign intelligence concerned with scientific and technological developments. This review stemmed largely from STAP's belief that foreign developments in science and technology in the decade ahead would become important determinants in the formulation of US foreign policy, national technology strategies, and national security planning. Of particular concern was the rate at which future developments in S&T are expected to take place, with corresponding impacts on international political, social, industrial, and economic systems. While the use of foreign S&T intelligence¹ in US defense planning was considered generally adequate, its use in political and economic contexts calls for new and innovative approaches in both collection and analysis. STAP was concerned about the IC's ability to identify such evolving policy needs and to affect the substantive and organizational changes needed to meet future S&T intelligence requirements in an adequate fashion []

Nuclear technology is not considered because this area is reviewed by the DCI's Nuclear Intelligence Panel. The technology under discussion is that of the "6.2" to "6.3"² stage. []

¹ The term scientific and technical intelligence, as used in this report, is the product resulting from collection, evaluation, analysis, and interpretation of foreign scientific and technical information which covers foreign basic research, applied research and development, and applied engineering techniques as early stages of military and civil systems. (U)

² In Department of Defense parlance, research is divided into four stages: 6.1 is research, 6.2 is exploratory development, 6.3 is advanced development, and 6.4 is full-scale engineering development. []

Because of shifts in the national-level consumer community, there are increasing numbers of policymakers requiring foreign S&T intelligence in nonmilitary areas. Typical needs include the implementation of S&T agreements with China and the USSR, energy and space policy decisions, and agreements arising from the World Administrative Radio Conference (WARC) in 1979. The collection and production of national intelligence in support of these new policy needs require new forms of analysis—often multidisciplinary, for example, techno-economic and technopolitical—and the development of new consumer relations and policy support mechanisms [] 25X1

STAP was concerned that the IC was not structured for the provision of multidisciplinary analysis, and that production of traditional political or economic intelligence on international issues containing significant S&T content might result in assessments or in political-military positions (for example, BW/CW³ assessments) based on inadequate technological understanding of how civil and military industrial capabilities interrelate. The significance of S&T developments and their relationship to the achievement of the political, economic, and military objectives of foreign nations are exceedingly complex issues, and their treatment by the IC could require considerable improvement in both intelligence data bases and in analytical techniques to make the required policy-related technology assessments. Finally, STAP was concerned that the existing consumer-producer relationships between national policymakers and the IC would neither support nor guarantee the effective communication of consumer requirements and intelligence production in areas not already well established. [] 25X1

³ Biological Warfare/Chemical Warfare. (U)

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STAP attempted to review the S&T intelligence cycle.⁴ A functional evaluation of individual cycle elements such as collection was made thus permitting an assessment of the IC's current capabilities to meet the new and evolving needs of policymakers. The

results, of course, have their limitations. The recommendations made, while functionally oriented, are not organizationally specific. Thus, appropriate implementation of these recommendations will require further examination by the IC []

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Stap Findings and Recommendations

Overall Findings

As a result of numerous briefings, interviews, and reading, STAP concluded that S&T intelligence, by itself, is often of limited utility. Few high-level consumers need or appreciate foreign intelligence products solely devoted to the technical aspects of foreign S&T developments. In order for S&T intelligence to be meaningful and relevant, it must be interpreted in terms of its political, economic, or military implications. []

STAP feels S&T intelligence is key to anticipatory analysis in both military and economic areas and can be of importance to US foreign policy initiatives that seek to obtain US political objectives on the basis of US science and technology. []

S&T intelligence becomes more important as S&T advances are made increasingly in countries other than the United States. We note that in the mid-1950s, the United States contributed three-fourths of S&T advances, but now contributes less than one-third. []

S&T intelligence also becomes important as natural resource constraints limit economic growth; as economic competition or, as some view it, economic warfare, intensifies among industrialized countries; as Western technology developments—paced by commercial rather than military needs—widen the gap

⁴ The S&T intelligence cycle studied by STAP comprises the identification of problems, collection against them, processing of collected data for analysis, the analysis itself, the publication and dissemination of results, and the feedback from consumers to the producers of S&T intelligence. []

between the West and both Communist and less developed countries (LDCs); and as access to Free World S&T sources becomes easier for foreign military planners. []

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Further, as foreign governments use their S&T advantages to achieve their foreign policy objectives, particularly in cases that conflict with US national security and economic interests, the need to provide US policymakers with S&T intelligence will increase. []

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Last, we note that collection and analysis of nonmilitary S&T intelligence has progressed little over the last 20 years. As a result, the IC analytical community is limited in the extent to which it can meet the new complex and sophisticated needs of policymakers. []

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Recommendations

Based on the above overall findings, STAP makes the following recommendations:

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- A dedicated effort must be made to increase the level of awareness within the IC of the increasing importance of S&T intelligence to broad US national security needs and foreign policy goals.

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- S&T intelligence should be collected and produced as an integral part of political, economic, and military intelligence.
- The responsibility for identifying key national S&T intelligence issues, coordinating Intelligence Community and other collection and S&T intelligence production on national issues, and serving as the DCI's principal adviser on S&T intelligence matters should be clearly assigned with appropriate lead responsibilities.
- In order to realize the full capability of S&T collection, a review of the tasking elements of the Intelligence Community should be made.
- The IC should establish a mechanism to assess the quality of community S&T intelligence products, both in terms of consumer values and substantive merit; outside assistance from contractors should be sought on the latter. 25X1

Specific Findings and Recommendations

The following more detailed findings and recommendations indicate the steps needed to organize the IC's S&T elements and processes, and to package in an integrated way S&T intelligence of importance in the military, economic, and political areas. 25X1

Identification—National Issues With Major S&T Content 25X1

STAP found that no one is assigned primary responsibility for identifying national issues with a major S&T content. There is no National Intelligence Officer for Science and Technology and the DCI's Scientific and Technical Intelligence Committee (STIC) is only partially responsible although its recent publication on S&T Priorities (STIC 81-001 Secret) is a step in the right direction. The current National Intelligence Topics (NITs) and the attachment to DCID 1/2 are not satisfactory vehicles for this task because (1) they lack specificity, (2) they require analytical interpretation for which no one has responsibility, and (3) they are not appropriate for time-urgent issues. 25X1

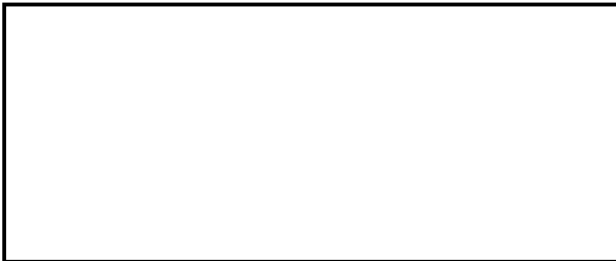
National issues with significant S&T content include:


- Military threat to US security—BW/CW developments and key military technology.
- Negotiations and monitoring of arms control treaties and S&T agreements.
- Scientific or technological surprise—S&T policy and strategy and sciences and emerging technologies.
- Industrial modernization—assimilation of technology.
- Nuclear proliferation.
- Availability of energy.
- Economic competition—civil technologies.
- Materials scarcity—substitute materials.
- Influences on government stability—physical health of VIPs.
- Technology transfer—foreign availability of technology. 25X1


- The IC should develop a general approach or methodology for assessing the long-range implications of foreign S&T developments that will provide the basis for anticipatory analysis in military, economic, and political areas.


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


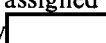
STAP found that many key policymakers must seek their own channels to the IC to make known their key issues. There are few, if any, identified points of contact. Only the NSC staff and OSTP have used NITs or equivalents to communicate their needs concerning key S&T issues. High-level consumers who have had prior experience with the IC use their own private channels—a form of “old boy network,” but the result is of variable quality. 

Most S&T consumers do not know or understand the IC or how to use it, although those few with intelligence officers on their staffs (for example, OSTP and Energy) can and do make better use of the community 


STAP recommends that responsibility for identifying priority national issues for S&T intelligence action be assigned with clear lead responsibilities identified. An approach is required that encourages interaction between the IC and consumers at both high and middle levels. 

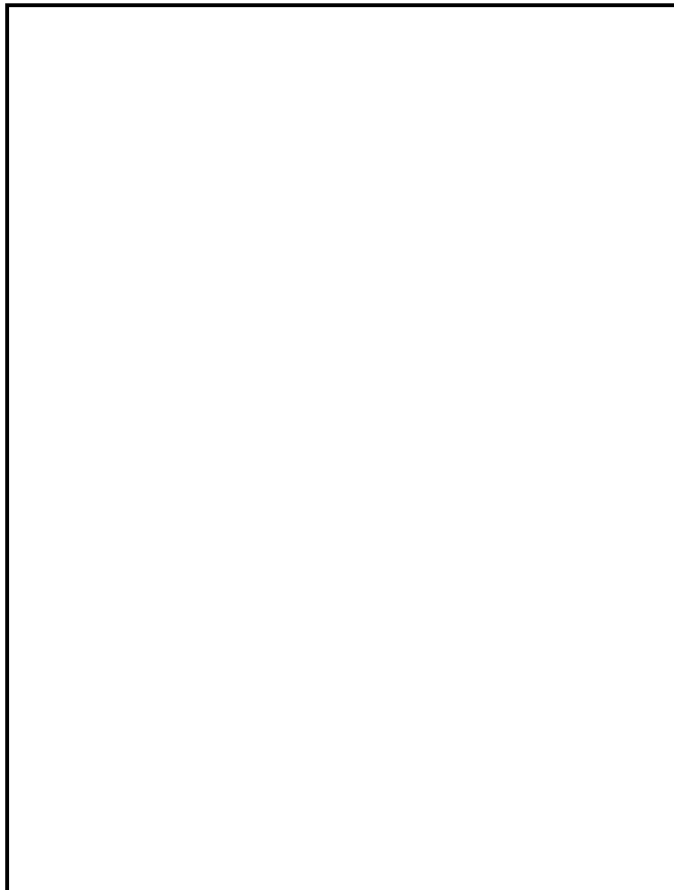
Intelligence Production Planning and Tasking

STAP found that there is no formal mechanism or designated official responsible for translating high-level consumer needs for S&T intelligence into IC production guidance. The task is left to individual production units and these efforts are inadequately coordinated. Neither the STIC nor the National Intelligence Council (NIC) system performs this task. The principal consumers tend to make direct production/support requests to various IC producers. Products also often are reactive (not all bad) and not anticipatory. Products are usually drawn from single production units, not the IC as a whole. 

Current production planning does not realize the full potential of S&T intelligence as a multidisciplinary element. S&T contributions to economic and political, as well as military, assessments are not being fully considered. The long-range anticipatory nature of S&T intelligence is mainly being used to make military assessments but even then only on a sporadic basis. S&T intelligence could provide long-range input for some political and economic assessments as well. Thus STAP recommends that the national S&T production planning responsibility be assigned to a technically qualified central authority 

Collection Tasking

STAP feels that national collection tasking on S&T issues requires both substantive expertise on a variety of issues and detailed knowledge concerning IC collection systems. In this area, the National Collection Planning Office has requested the STIC to provide substantive expertise 



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Analysis and Production

STAP found that the analysis of S&T intelligence, as opposed to weapon system analysis, continues principally to be a "desk top" process. Few new analytical techniques are developed or used; there is little systematic effort to assess the long-term implications of S&T developments; and there is little effort to utilize outside analytical communities such as industry, banks, "think tanks," and universities []

STAP sees little interdisciplinary use being made of S&T intelligence in IC products and little effort to use S&T intelligence projections as the basis for conducting anticipatory analysis in economic and political areas, although anticipatory analysis in military areas is quite active and makes considerable use of S&T intelligence []

There is little coordination or planning of S&T analysis and production within the IC, and too few efforts are made to incorporate S&T intelligence into other IC products. The IC tends to produce too much of its S&T intelligence in formal publications, while policy-makers also desire to receive oral briefings and to interact with the intelligence analyst. STAP feels that for S&T intelligence collection, feedback from the analytical community is crucial []

STAP believes that selected S&T analysis should become an integral part of military, economic, and political analyses. Responsibility for coordinating S&T intelligence analysis across the IC should be assigned. In support of the three areas, military, economic, and political, STAP feels there should be

dedicated S&T efforts on anticipatory intelligence analysis; a general approach or methodology should be developed to assess the long-range implications of foreign S&T developments []

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Consumer and Analytical Feedback

STAP found no organized effort to evaluate the quality of the IC finished S&T intelligence product. Analysts tend to be evaluated on performance—numbers of reports—rather than on the value of the product. STAP feels that feedback from the consumer is also critical to improved collection performance.

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STAP recommends that greater attention be given to consumer/analyst interaction, including more frequent personal discussions. The IC should establish a means of evaluating better the quality of its finished S&T intelligence products. Consumers should be kept informed regarding these evaluations. Also, an effort should be made to understand better how S&T analysis is currently carried out, how it is evaluated, and how good analysts are identified. []

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Concluding Remarks

From the review of S&T intelligence reported here, it is possible to draw certain overall conclusions about the nature of the activity and to identify a few broad issues deserving further consideration []

Both the acquisition of specific S&T collection capabilities as well as the tasking of existing collection assets suffers from the peculiar nature of S&T information. S&T is the beginning of a development chain

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and thus lacks a well-defined foundation on which collection requirements can be based. The paradox that if you do not know what you are looking for you will never find it affects the S&T intelligence process particularly strongly [redacted]

Moreover, the exotic cutting-edge nature of much of the science and technology of importance makes it difficult to communicate with resource managers either in the budgetary process, in the tasking of collection assets, or in the allocation of analytical resources. The increasingly imprecise and high-risk nature of the S&T enterprise, the apparent inefficiency of the process, and the long period between the identification of S&T areas of concern and the emergence of threats to national security make it too easy to postpone necessary investments of always limited intelligence resources. Lacking any overwhelming sense of urgency, the S&T "cycle time" becomes effectively infinite. [redacted]

What has also been underlined by this examination of S&T intelligence is that it often lacks special collection and analytical approaches tailored to its unique character. Unlike military developments that take place at reasonably well-defined locations and under organizational relationships that have been well established as the result of years of attention by the IC, S&T targets are much more widely distributed, both geographically and organizationally. Key S&T developments or critical supporting activities often take place in "civil" contexts, both industrial and academic, that are different from the locus of more conventional intelligence concerns. Similarly the "collectors" are more apt to be academic, industrial, and financial sources who do not have established relationships with the IC. By the same token the IC has few contacts with such sources and little experience in selecting, tasking, and exploiting them. Unlike the more precise nature of "later stage" targets in the weapon development process, at the S&T stage the IC is confronted with a very large base of actual or potential information but with few management tools

available to cope with the flow of information and to analyze it for patterns and interrelationships. Thus new relationships must be established with the sources of "early stage" S&T information, and new approaches and methodologies are needed to assist in its analysis. [redacted]

A key goal of S&T intelligence must be protection of the United States against technological surprise. The surprise referred to is not the simple matter of finding something new, for most discoveries of something new are, essentially, a "surprise." The point is that technological surprise is so important in its national security implications that by itself it creates a perception of US disadvantage. Technological surprise also includes the notion of a development capable of such rapid exploitation that the United States is unable to generate countervailing approaches in time. [redacted]

This goal, while awkward by its nature for the IC to deal with, may suggest alternate approaches to the current S&T intelligence paradigm. Instead of "collecting everything" and then ordering the results in terms of security threat potential, it may instead be useful to invert the process and systematically search for areas of particular United States vulnerability to technological surprise. [redacted]

This approach suggests a different set of problems for the IC than those it is currently approaching. How does one do a systematic survey of areas of US vulnerability? What are the areas of greatest US sensitivity, for example, to Soviet leverage? How does one then relate the conclusions of such a process back to the management of IC resources? The answers to these and similar questions are beyond the scope of the investigation reported upon here. But it is an inescapable conclusion that new approaches are needed across the board to the S&T intelligence activity. [redacted]

Finally, one can ask what kind of analyst is needed for S&T intelligence. Is the S&T analyst different in important ways from other intelligence analysts? For example, S&T intelligence analysts are forced to rely more heavily than other analysts on long thin inferential chains of evidence and reasoning. The resultant "hypothesis trees" are thus unusually rich in possible interpretations for which the necessary data are either

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lacking or, if available in principle, cannot be related in fact. The kind of technical mind that can cope with the large number of alternative hypotheses and which must deal with these major uncertainties for unusually long periods of time may be different from those currently involved in the process. The selection, training, and career development patterns of S&T analysts perhaps should be different from those in other parts of the intelligence system. STAP believes that these issues deserve further consideration by IC managers.

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Approved For Release 2006/09/28 : CIA-RDP83M00914R000700070004-8

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Science and Technology Advisory Panel

STAP RESUME

The Science and Technology Advisory Panel (STAP) was formed by the Director of Central Intelligence in 1976. It serves the DCI as a source of independent advice and expertise on a variety of scientific, technical, and management issues. The membership includes renowned senior scientists, executives, and other leaders from industry, academe, and government.

The STAP meets quarterly in plenary session where, inter alia, formal briefings are presented, reports approved, and direct consultation with the DCI is effected. At other times small working groups or sub-panels are formed to respond to DCI tasking, address specific issues, and provide STAP participation in technical studies or other ongoing projects.

The STAP also responds to requests for assistance from any Deputy Director or senior line manager who believes a STAP member's expertise may contribute to resolving a difficult technical intelligence problem. STAP assistance may be in the form of an informal discussion, a written memorandum, or a formal study or report signed by the Chairman and forwarded to the DCI.

Principal functions of the STAP include:

- To insure the DCI and senior Intelligence Community managers are forewarned of significant advances in state-of-the-art technology and in new applications of existing technology.
- To identify and highlight the implications of current and future S&T developments for intelligence activity.
- To provide linkages and interactions between the intelligence community and the scientific and technical communities in industry, academe, and government, as appropriate.
- To provide a quality control mechanism; an outside source for objective evaluation of current and planned S&T-related intelligence activity.
- To review evidence on existing S&T intelligence "enigmas" and to introduce new thinking and suggest avenues for solving these unknowns.